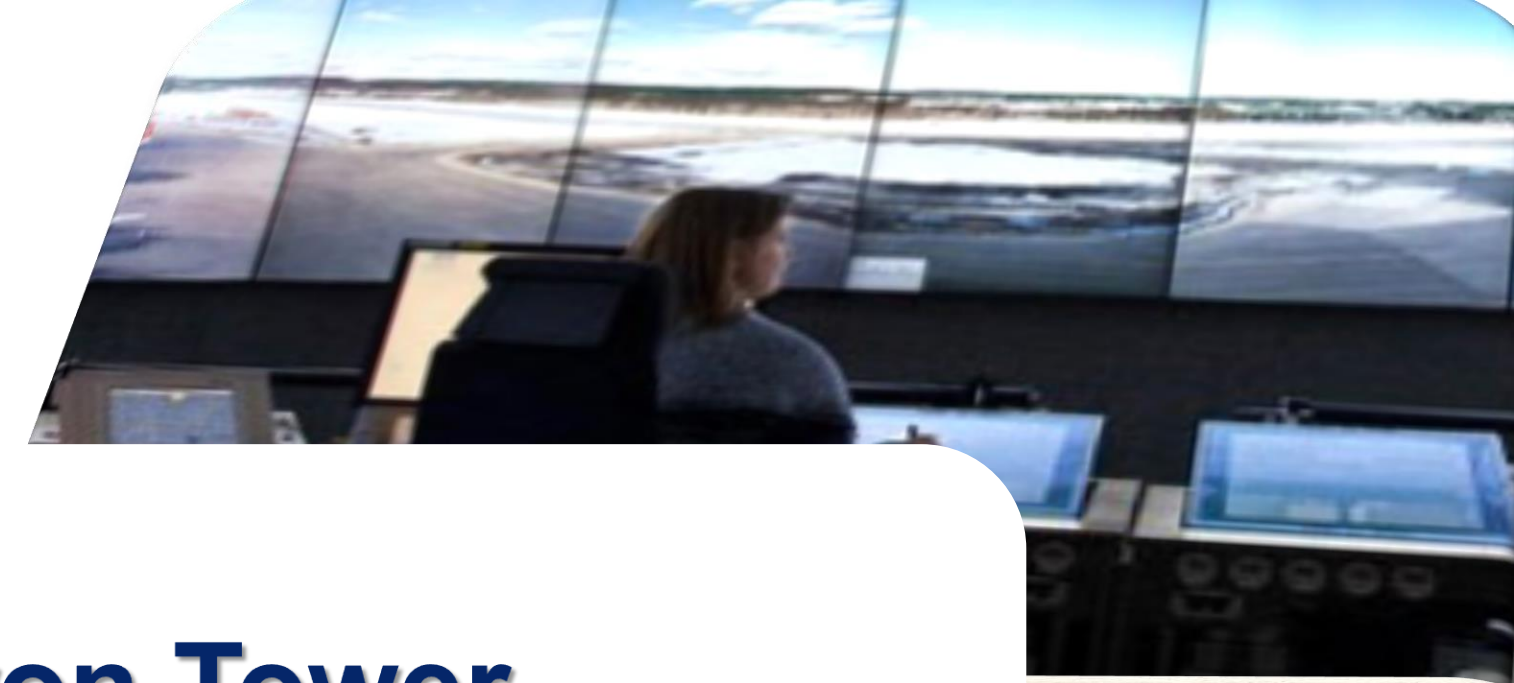
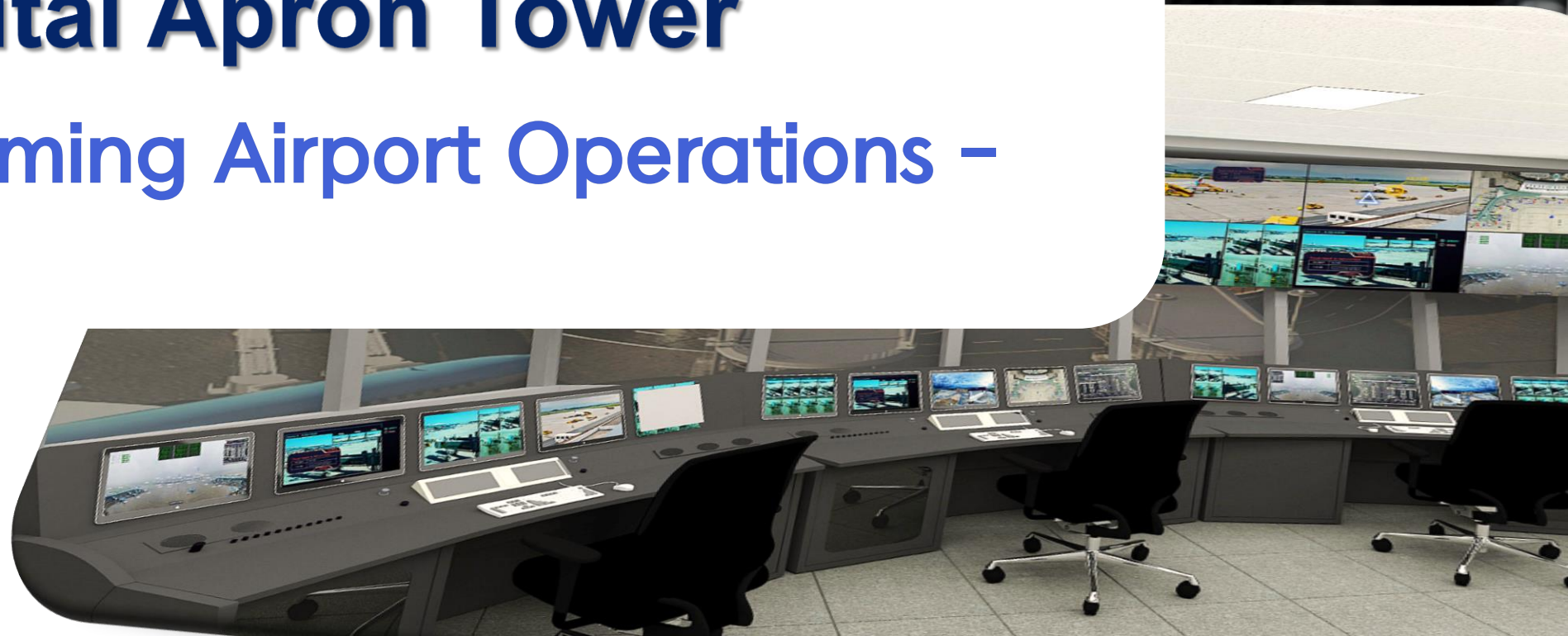
Incheon Airport
인천국제공항공사

Digital Apron Tower System



Digital Apron Tower

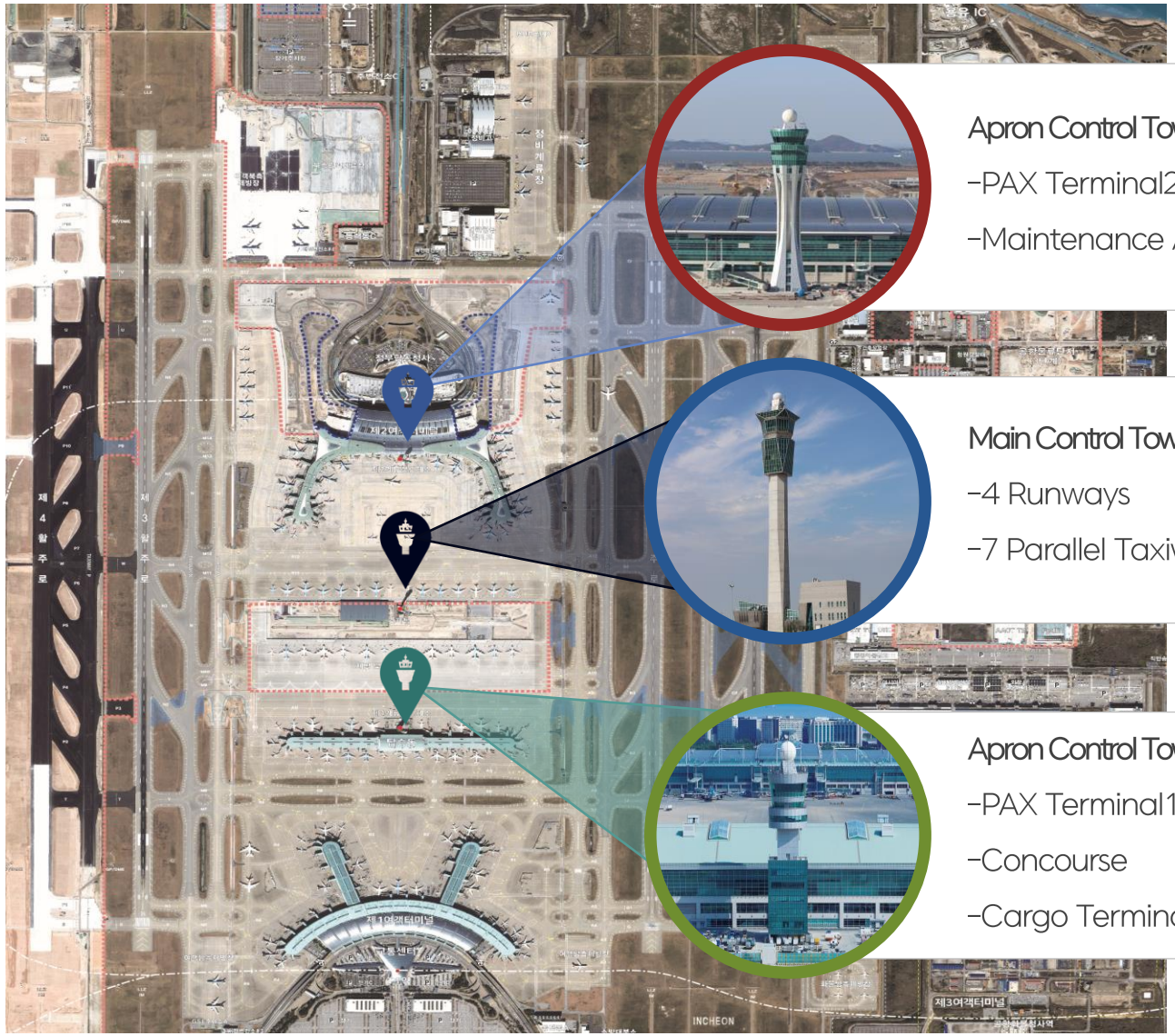
- Transforming Airport Operations -



Jul 2024

ICAO AOPSG8

Air Traffic Control Operations at Incheon airport



Apron Control Tower 2
-PAX Terminal2
-Maintenance Apron

Main Control Tower
-4 Runways
-7 Parallel Taxiways

Apron Control Tower 1
-PAX Terminal1
-Concourse
-Cargo Terminal 1 & 2

Digital Tower at Incheon airport?

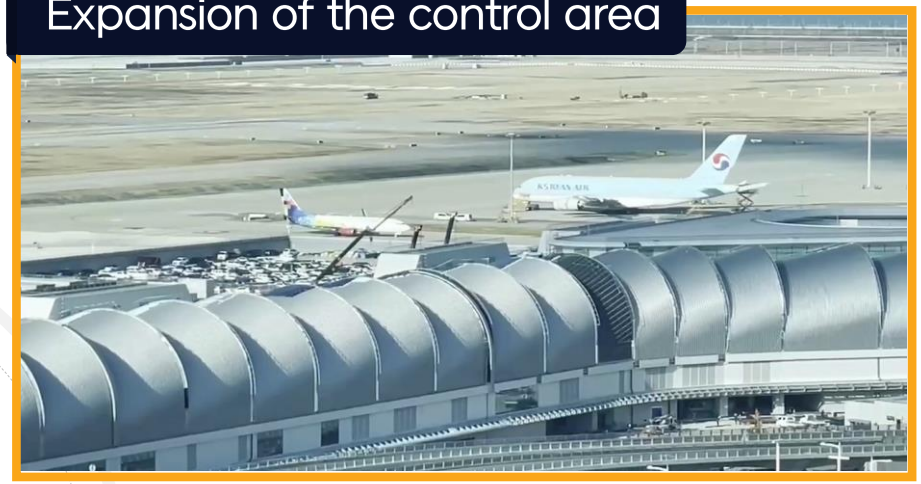
- Incheon Airport is effectively covered by three ATC towers

"Is a digital tower needed at Incheon Airport?"

Background

Aircraft blind spot

Expansion of the control area



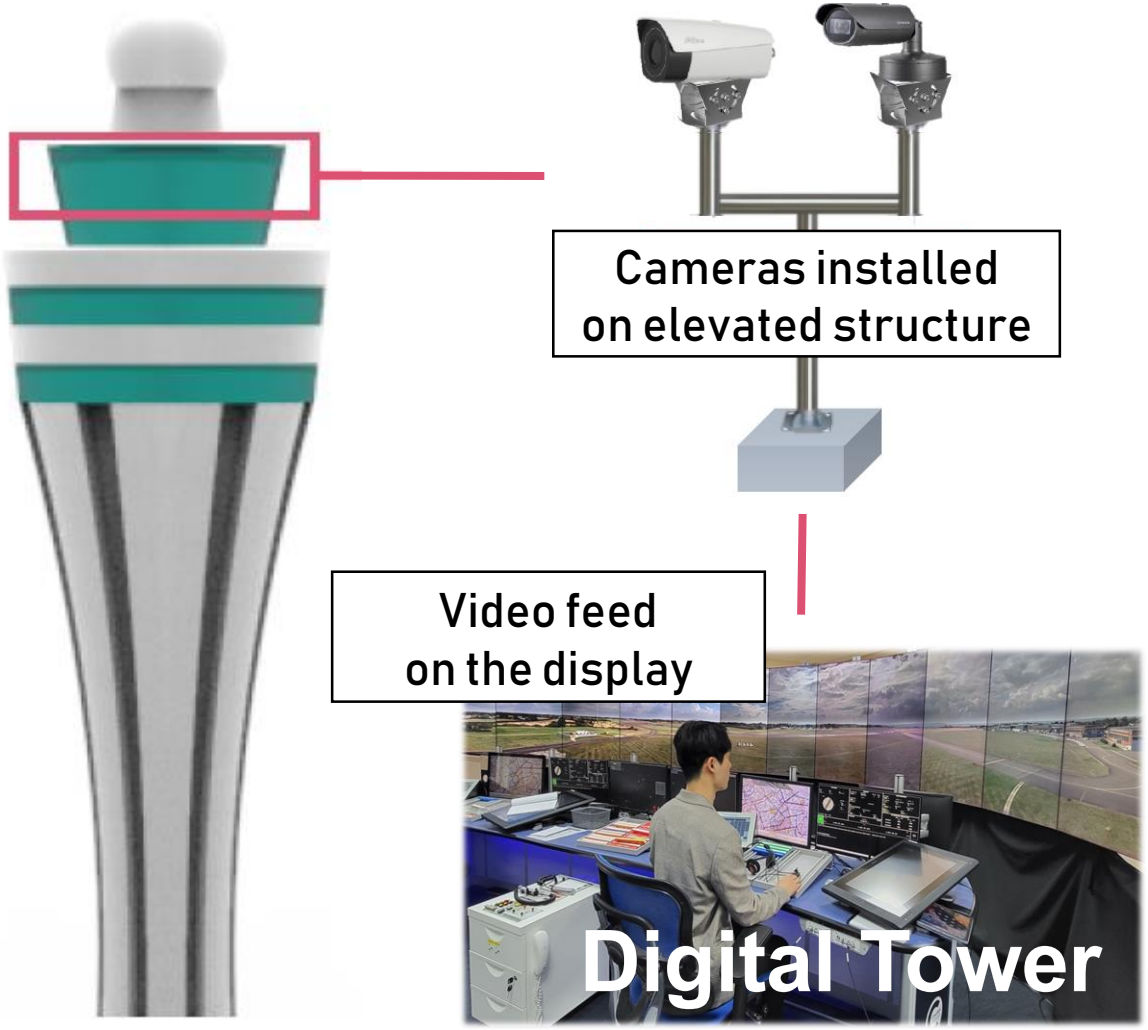
Low visibility condition

Need for futuristic system

Human error (Pilot, Controller)

What is Digital Tower?

Digital Tower Process



01 Digital Tower definition

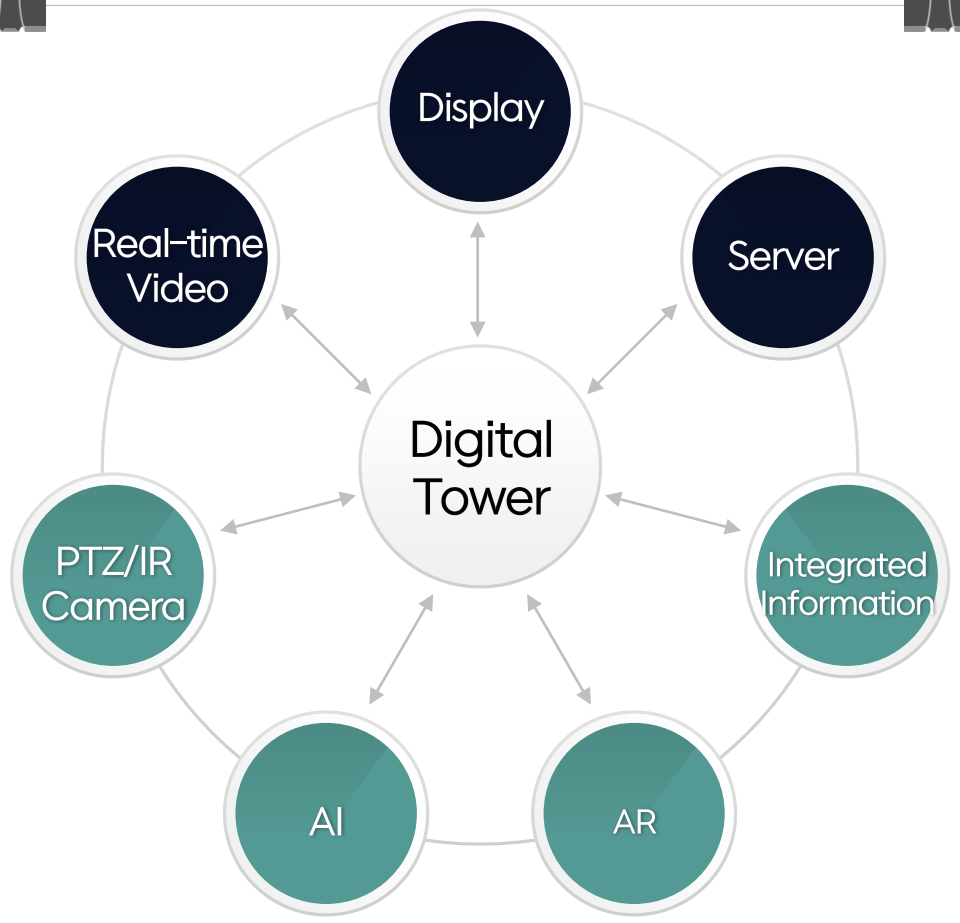
- Digital Tower is advanced systems to provide controllers with a view of the aerodrome and its vicinity and can replace the traditional physical tower.
- ICAO ASBU DATS-B1/1
  : Remotely Operated Aerodrome Air Traffic Services

02 The benefit of Digital Tower

- Cost Efficiency
  - Reduced construction costs for Air Traffic Control Tower
- Can be located anywhere
  - Single Remote Tower
  - Multiple Remote Tower

) can be located away from airport

Digital Tower Technology

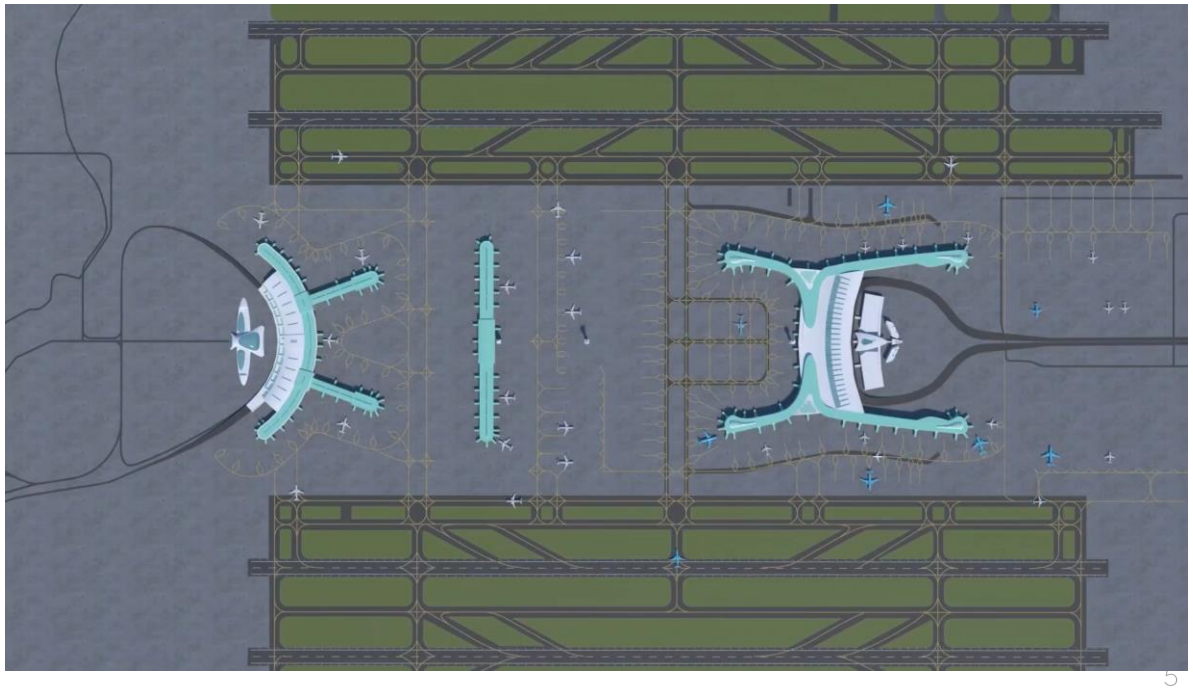


Replacement of Physical Tower + α Additional functions not present in physical towers

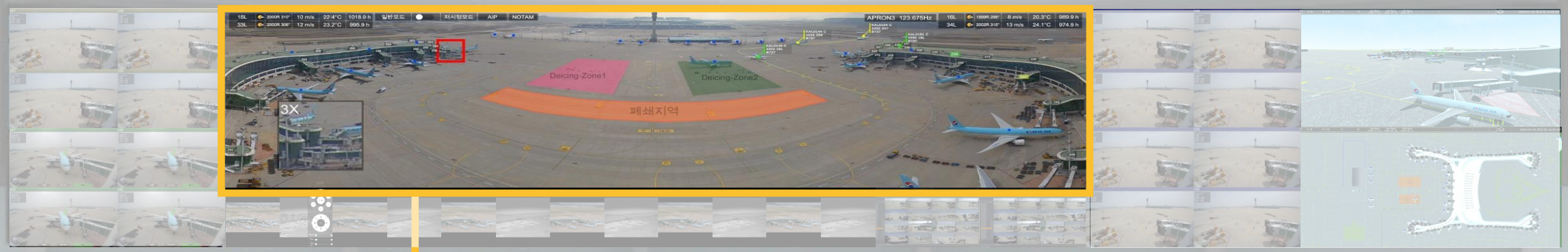
Smart Integrated Control Platform

α Additional functions of Digital Tower

Apply Digital Tower Technology to Physical Tower



Smart Integrated Control Platform (Display)



01 Panorama view

- Camera on top of ATC tower
- Display whole control area using Stitching technology

02 Gate view

- Camera in each gate
- Display of DEP/ARR gate
- Object detection

Smart Integrated Control Platform (Display)

01 Panorama view

- Camera on top of ATC tower
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02 Gate view

- Camera in each gate
- Display of DEP/ARR gate
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Smart Integrated Control Platform (Display)

03 Digital Twin view

- Provide various views such as 2D and 3D
- Display various control information

Key Functions

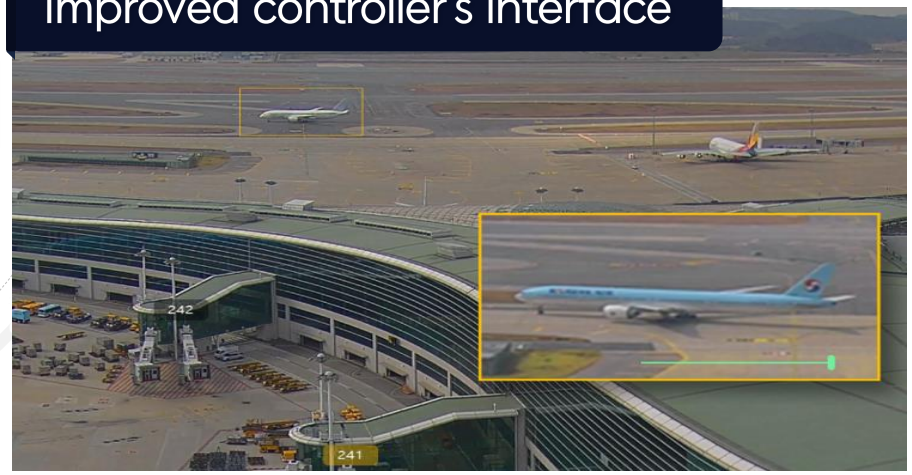
Integration of information

Enhanced aircraft surveillance

Notification of Abnormal Situation

Key Functions

Improved controller's interface



Key Functions

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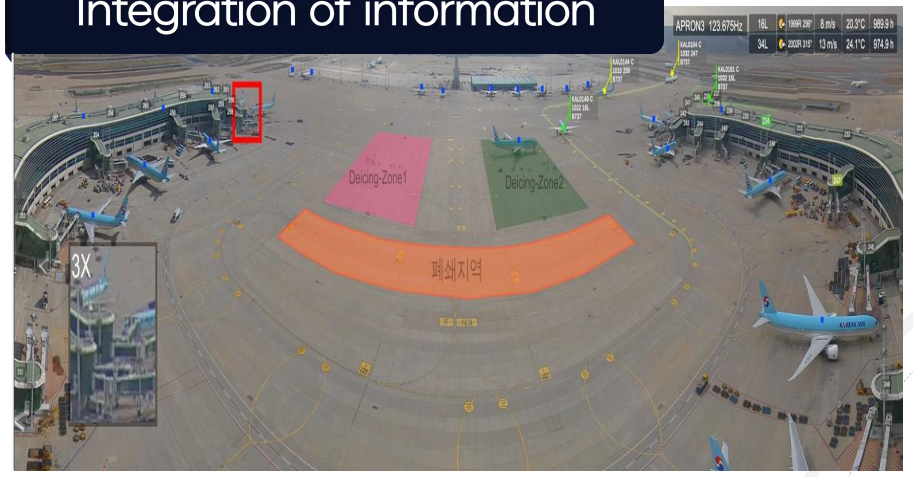
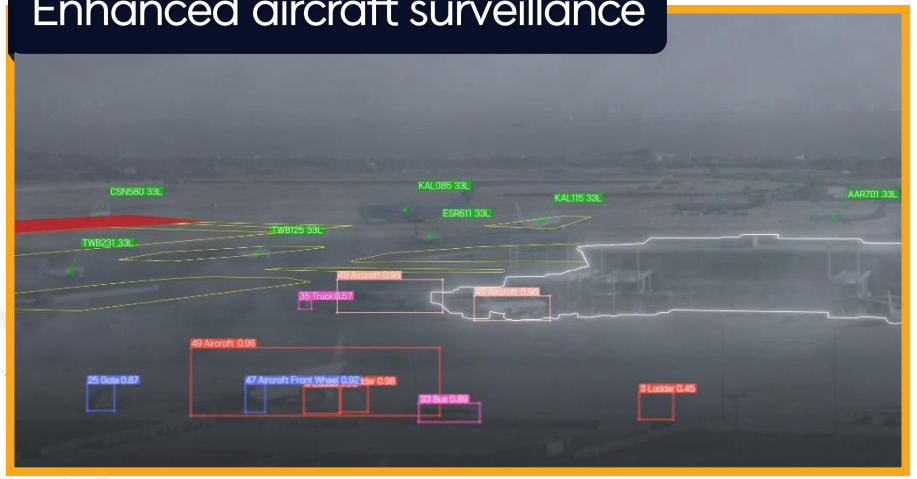


Enhanced aircraft surveillance



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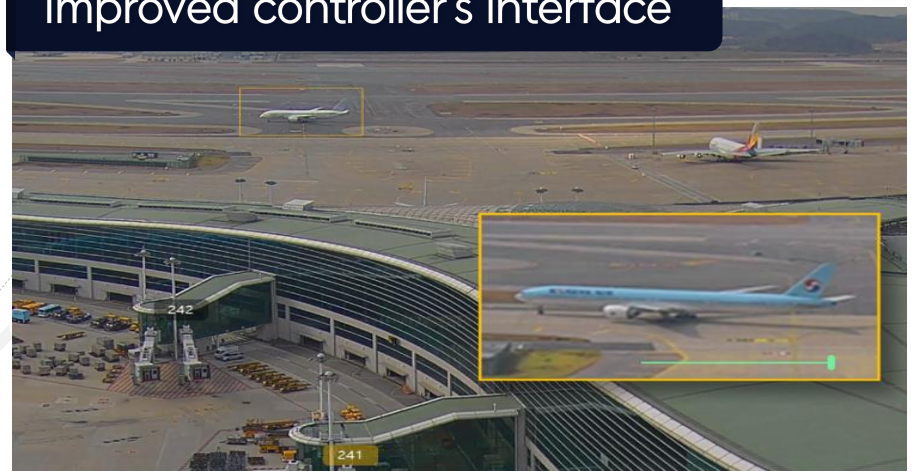

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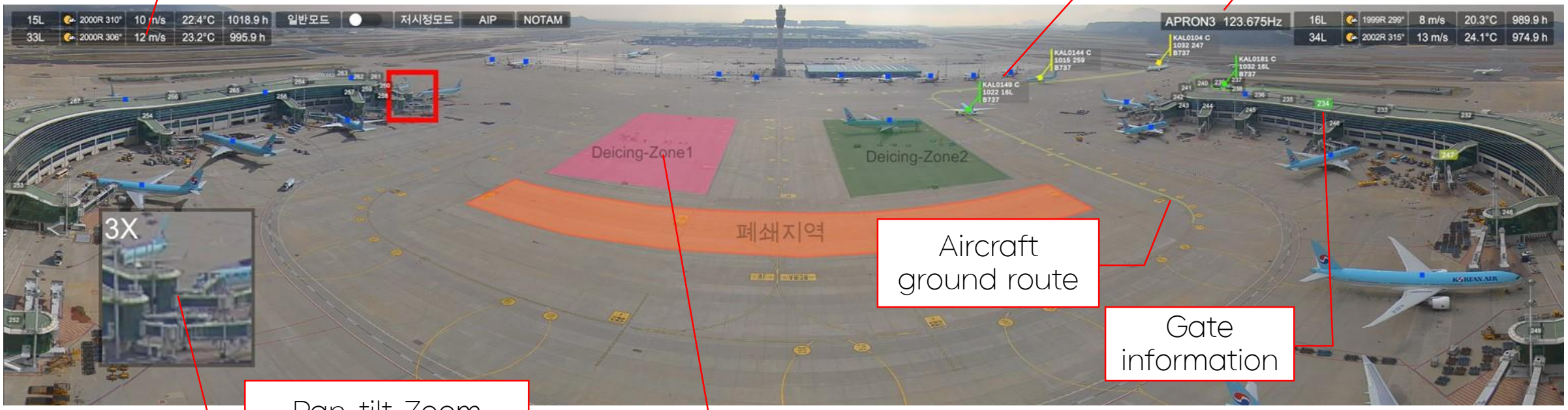

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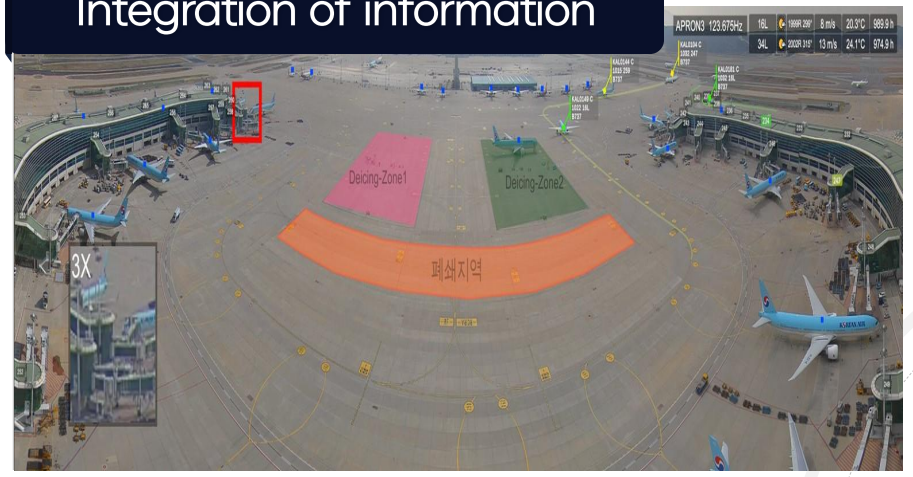

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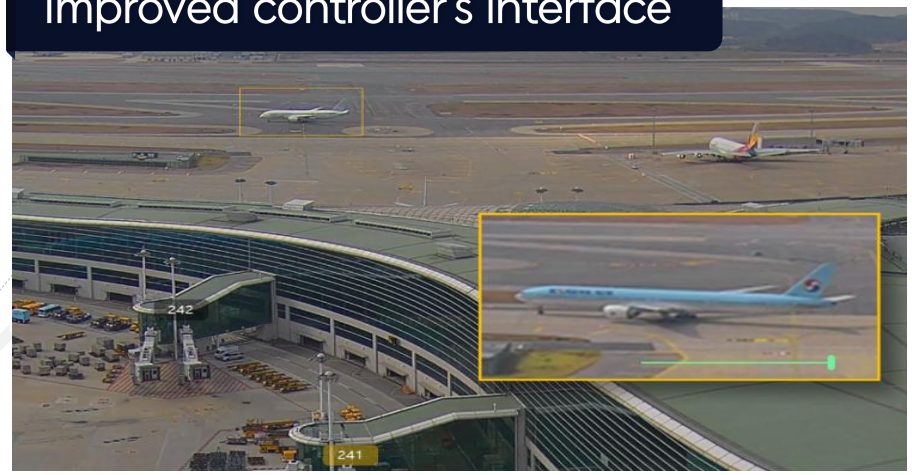

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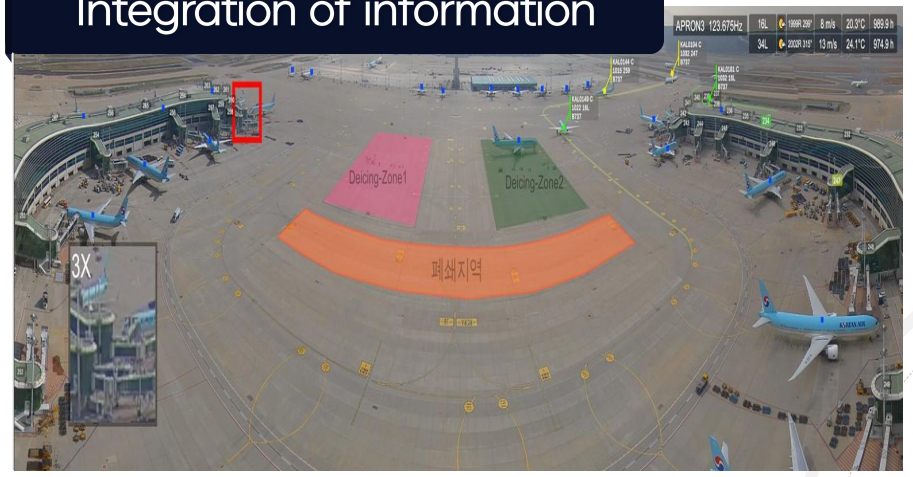

Enhanced aircraft surveillance

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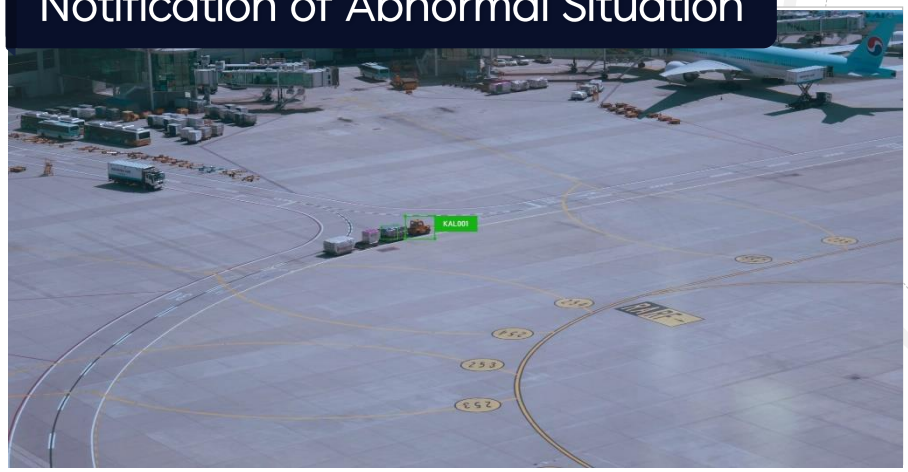

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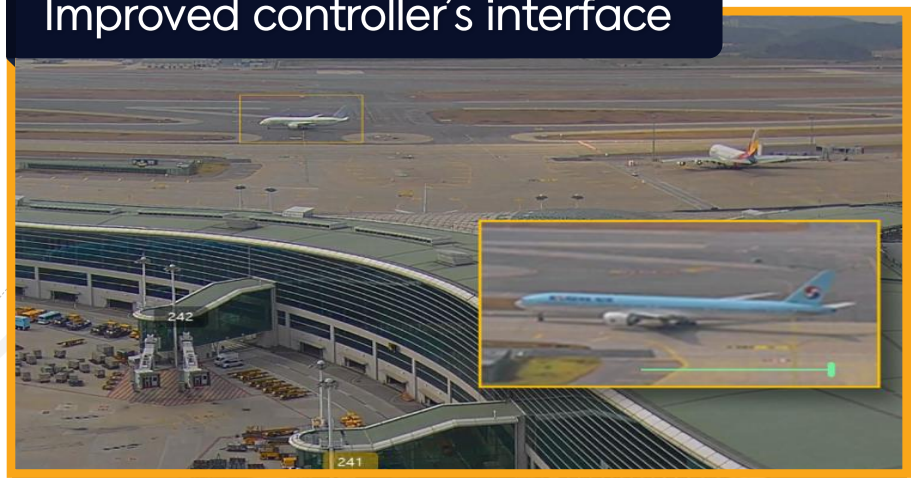
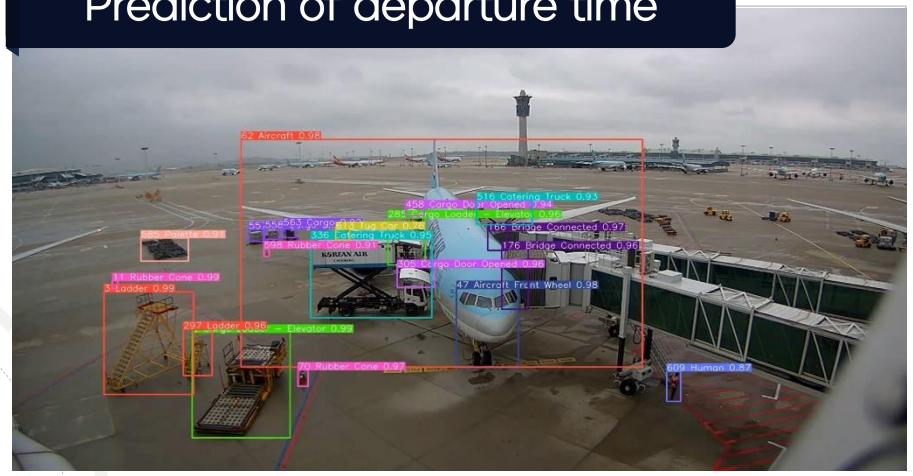


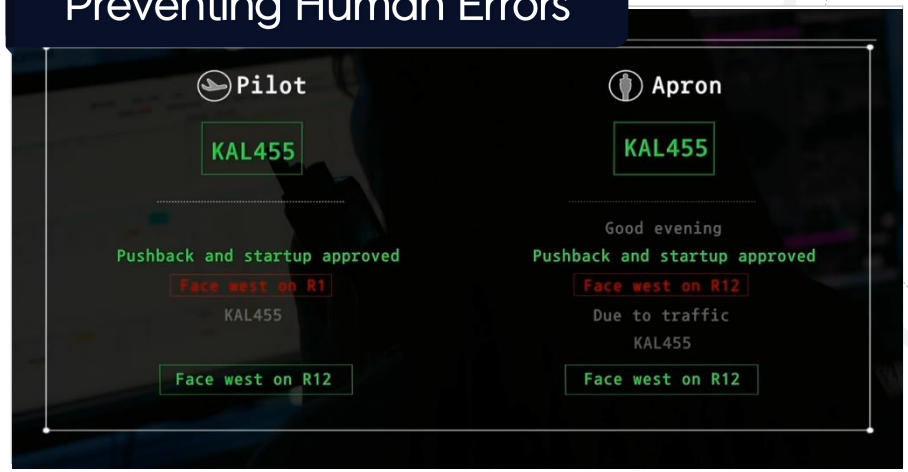
Key Functions

Gate Status Monitoring

Prediction of departure time



Preventing Human Errors



Key Functions

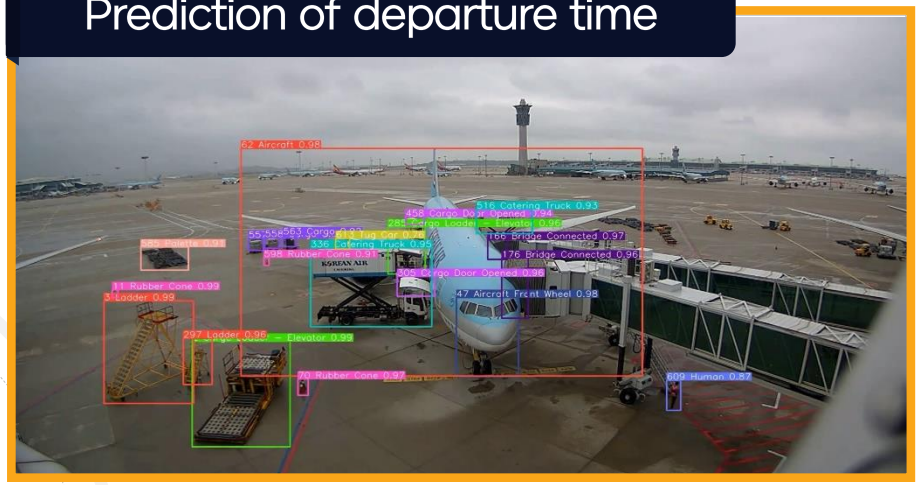
Digital Twin of Apron

Key Functions : Gate Status Monitoring

Key Functions

Gate Status Monitoring

Prediction of departure time



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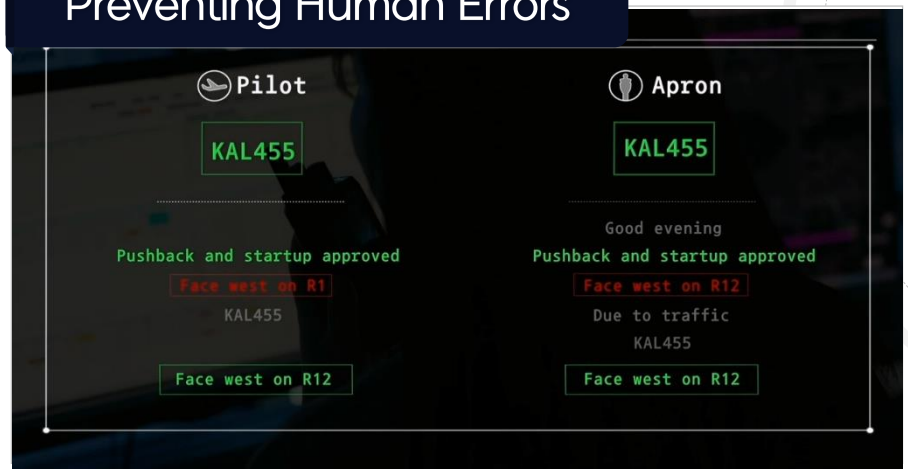


Key Functions

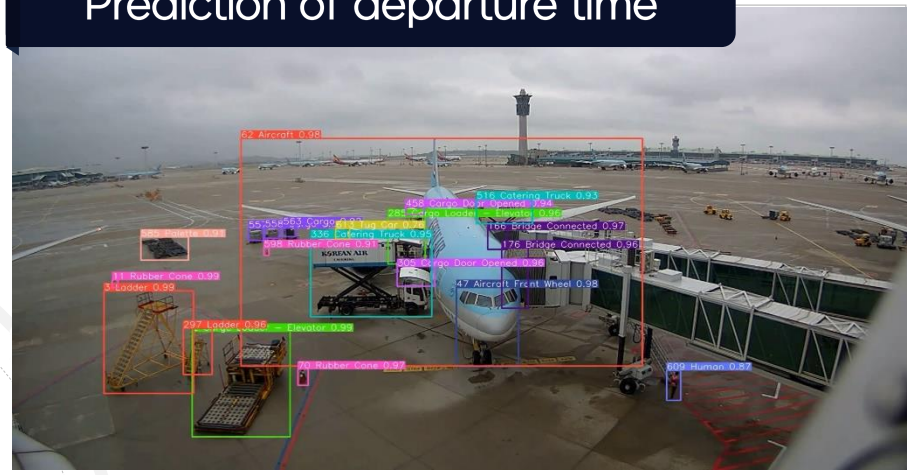
Digital Twin of Apron


34 Human 0.90
4 Palette 0.97
12 Palette 0.94
6 Palette 0.97
11 Rubber Cone 0.94
3 Ladder 0.97
7 Ladder 0.97
8 Tug Car 0.96
2 Cargo Loader – Elevator 0.99
1 Cargo Loader – Elevator 0.99
16 Human 0.93
5 Cargo Loader – Conveyor Belt 0.97
42 Rubber Cone 0.87
43 44 Human 0.75
15 Human 0.94

Key Functions

Gate Status Monitoring

Prediction of departure time



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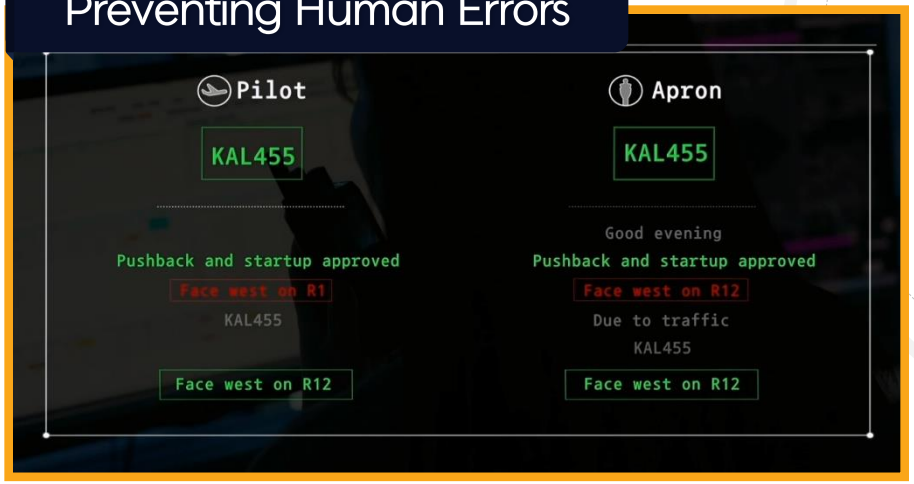


Key Functions

Digital Twin of Apron

Pilot

KAL455

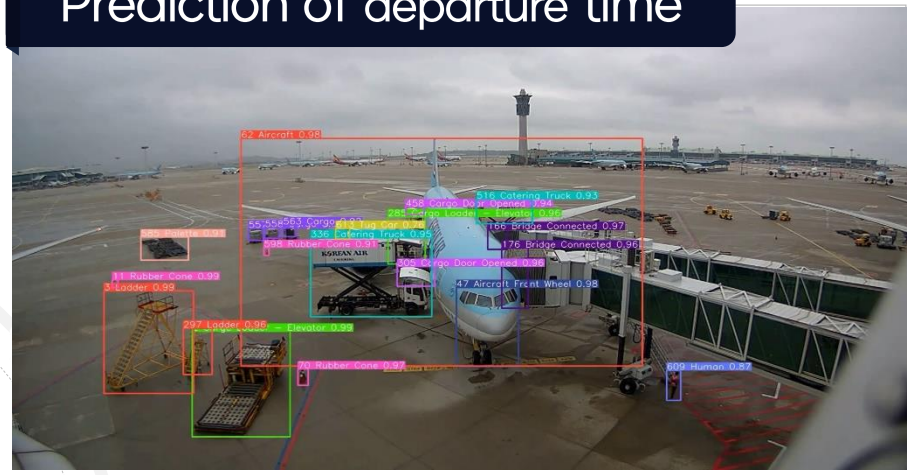
Apron

KAL

Key Functions

Gate Status Monitoring

Prediction of departure time



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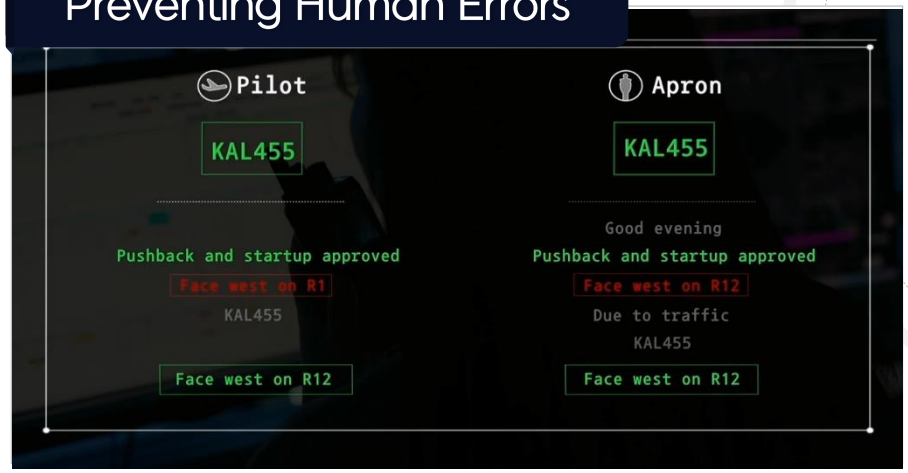
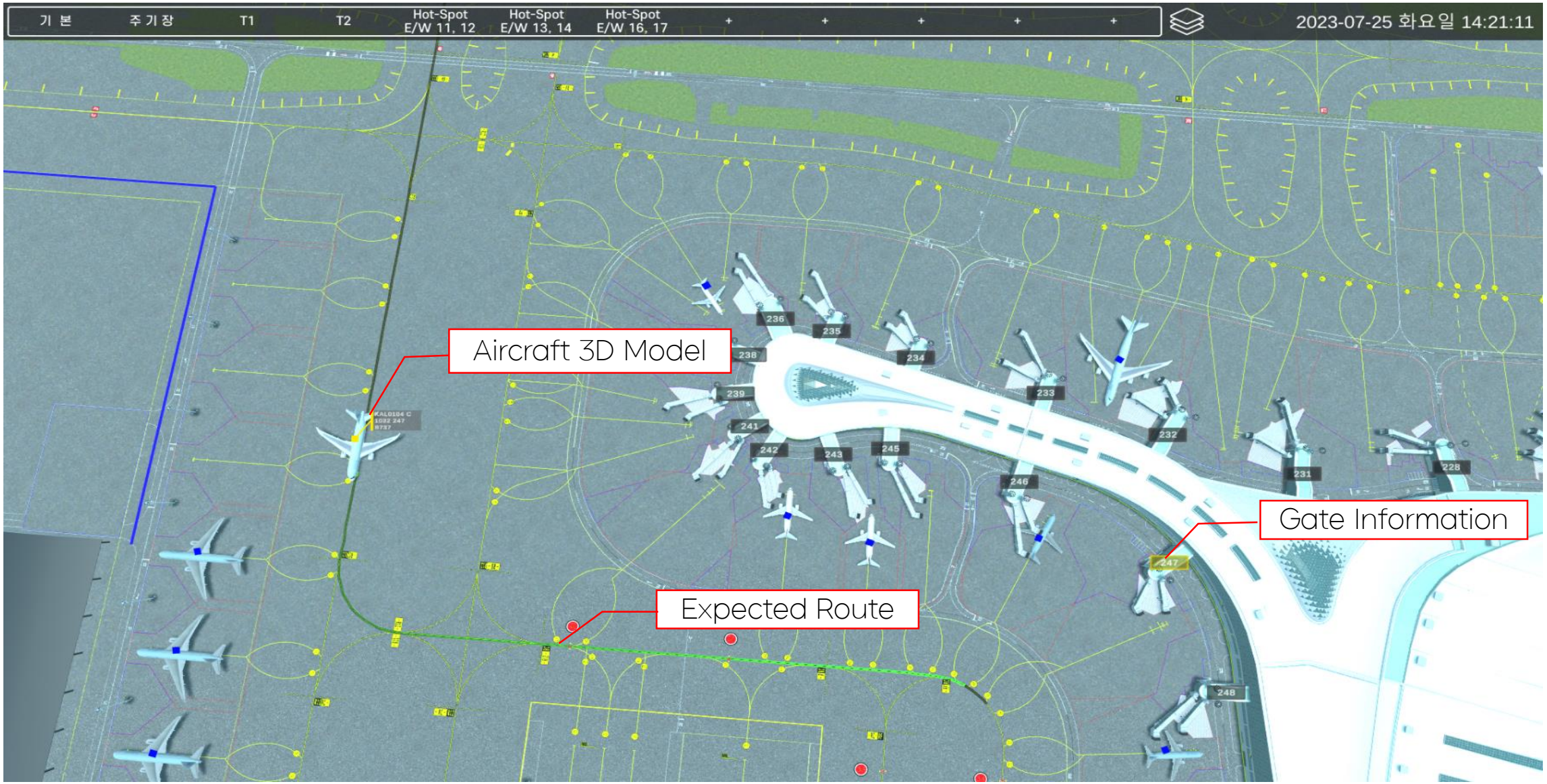


Key Functions

Digital Twin of Apron

Incheon Airport

Key Functions: Digital twin

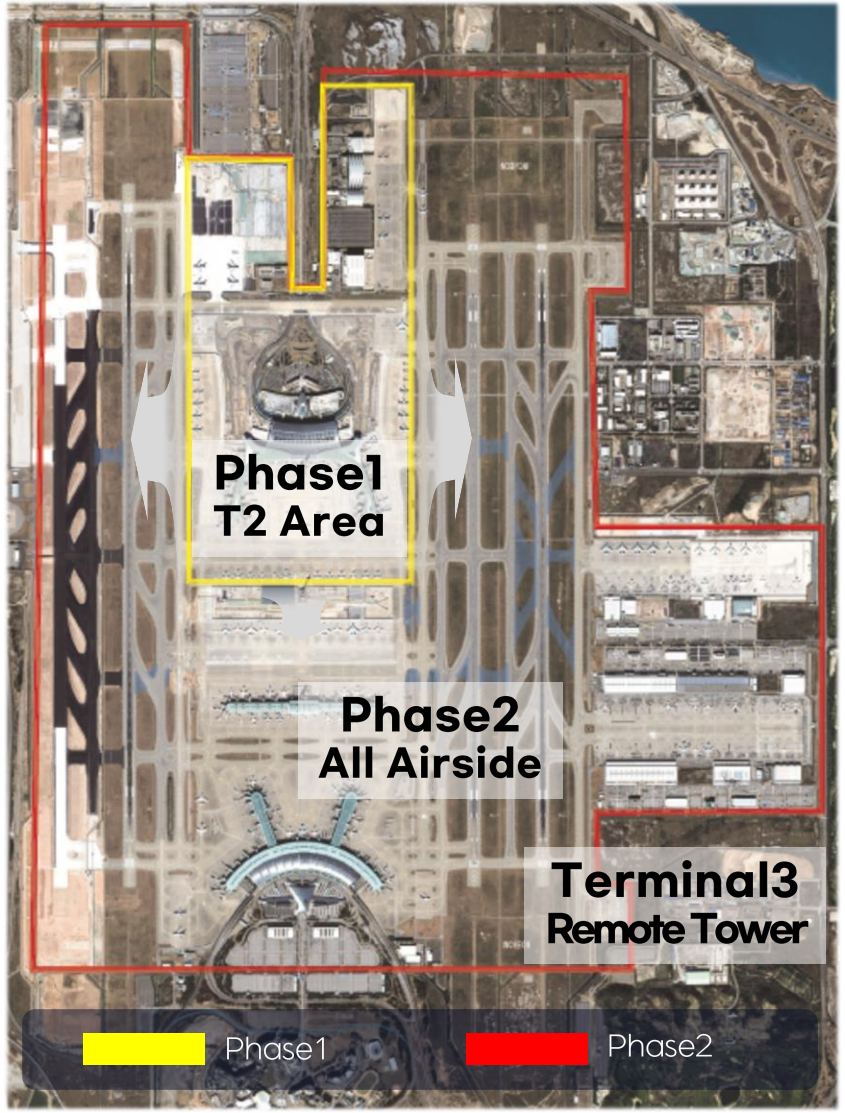


Conclusion and Future Plan

Smart Integrated Control Platform

- Initiate deployment in Terminal2 and expand to the entire airside
- Integration of various control equipment into a single platform (Phase2)
- Enhancing the operational safety of Incheon airport and it can increase sector capacity of apron controllers from 24.6 to 26.4 (sectors per hour)
- Consider building a remote tower instead of a control tower when expanding the airport further in the future

Phase 1	Phase 2	Remote TWR
Partial Establishment	Expand Entire airside	New Remote TWR
'22~'24	'25~'27	'32~
Terminal 2	Maneuvering area Terminal 1, Concourse Cargo Terminal 1, 2	Terminal 3 (Masterplan in progress)



Integrated Controller Working Position

THANK YOU

WE CONNECT LIVES, CULTURES AND THE FUTURE

Incheon Airport
인천국제공항공사